

### ABSTRACT

Compositions including modified carbide-containing nanorods and/or modified oxycarbide-containing nanorods and/or modified carbon nanotubes bearing carbides and oxycarbides and methods of making the same are provided. Rigid porous structures including modified oxycarbide-containing nanorods and/or modified carbide containing nanorods and/or modified carbon nanotubes bearing modified carbides and oxycarbides and methods of making the same are also provided. The compositions and rigid porous structures of the invention can be used either as catalyst and/or catalyst supports in fluid phase catalytic chemical reactions. Processes for making supported catalyst for selected fluid phase catalytic reactions are also provided.